

भारतीय मानक

दीवारों और विभाजनों के लिए पकी मिट्टी की खोखली  
ईंट और ब्लॉक — विशिष्टि  
( तीसरा पुनरीक्षण )

*Indian Standard*

BURNT CLAY HOLLOW BRICKS AND BLOCKS FOR  
WALLS AND PARTITIONS — SPECIFICATION  
( *Third Revision* )

ICS 91.100.25

© BIS 2013

**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Clay and Stabilized Soil Products for Construction Sectional Committee had been approved by the Civil Engineering Division Council.

Burnt clay hollow bricks/blocks are light in weight and being hollow, impart thermal insulation to the building. Further, with the setting up of a number of mechanized plants for clay building products in different parts of the country, these bricks/blocks are being produced in larger quantities and finding greater application in general building construction.

This standard was first published in 1967 and subsequently revised in 1978 and 1988. This standard covered three sizes of hollow bricks. It was brought to the notice of the Committee that there is sufficient demand for larger size units, that is, hollow blocks and that the manufacturers were meeting such demands at present. This had lead to a situation where hollow blocks satisfying other requirements of the standard, but not the requirements regarding dimensions were classified as not satisfying the requirements of the standard. Therefore, the Committee reviewed the relevant clause of the standard and decided that the current revision of the standard will also include the larger size units, that is, hollow blocks in addition to the hollow brick sizes specified in the standard.

The major changes incorporated in this revision are given below:

- a) Scope of the standard has been expanded to include hollow blocks in addition to hollow bricks already covered in the standard. Accordingly, title of the standard has also been modified.
- b) Requirement for minimum compressive strength of individual brick/block has been modified.
- c) Procedure for sampling and criteria for conformity has been modified.

The composition of the committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

# Indian Standard

## BURNT CLAY HOLLOW BRICKS AND BLOCKS FOR WALLS AND PARTITIONS — SPECIFICATION

### ( Third Revision )

#### 1 SCOPE

This standard covers the requirements for general quality, dimensions and physical requirements of hollow bricks and blocks made from burnt clay and having perforations through and at right angle to the bearing surface.

#### 2 REFERENCES

The standards listed below contains provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
2248 : 1992	Glossary of terms relating to clay products for buildings ( <i>second revision</i> )
3495 (Part 3) : 1992	Methods of tests of burnt clay building bricks: Part 3 Determination of efflorescence ( <i>third revision</i> )
5454 : 1978	Methods for sampling of clay building bricks ( <i>first revision</i> )

#### 3 TERMINOLOGY

For the purpose of this standard, the terms and definitions given in IS 2248 shall apply.

#### 4 GENERAL REQUIREMENTS

**4.1** The bricks/blocks shall be made from suitable clay. The bricks/blocks shall be free from cracks, flaws and nodules of free lime and they shall be adequately burnt. They shall have plane rectangular faces with parallel sides and shall have sharp straight edges at right angle. They shall have a fine compact and uniform texture.

**4.2** The bricks/blocks shall be free from excessive winding or bowing and where necessary, all external angles shall be right angles. The bricks/blocks shall be tested for trueness of shape as specified in **4.2.1** to **4.2.3**.

##### **4.2.1** *Winding or Bowing in the Length Dimension*

The bricks/blocks shall be placed between two parallel

straight edges running along the length (*see* Fig. 1) and the distance between either straight edge and the adjacent face of the bricks/blocks at any point shall not be more than 5 mm.

##### **4.2.2** *Concavity or Convexity in the External Face of the Bricks/Blocks*

The bricks/blocks shall be placed between two parallel straight edges running diagonally across the face of the bricks/blocks (*see* Fig. 2) and the distance between either straight edge and the adjacent face of the bricks/blocks shall not be more than 5 mm at any point on either diagonal.

##### **4.2.3** *Angles Between Sides and Joining Edges*

Any variation from a right angle in the angle contained by any side and a joining edge shall be limited so that if a builder's steel square is placed against the angle, the maximum distance between the inner edge of the square and the side shall not be more than 5 mm (*see* Fig. 3).

#### 5 TYPES

The bricks/blocks shall be of the following types:

- a) *Type A* — Bricks/Blocks with both faces keyed for plastering or rendering;
- b) *Type B* — Bricks/Blocks with both faces smooth and suitable for use without plastering or rendering on either side; and
- c) *Type C* — Bricks/Blocks with one face keyed and one face smooth.

#### 6 DIMENSIONS AND TOLERANCES

##### **6.1** Dimensions

###### **6.1.1** *Hollow Bricks*

The size of burnt clay hollow bricks when measured according to **6.2** shall be as follows:

<i>Length</i>	<i>Width</i>	<i>Height</i>
mm	mm	mm
190	190	90
290	90	90
290	140	90

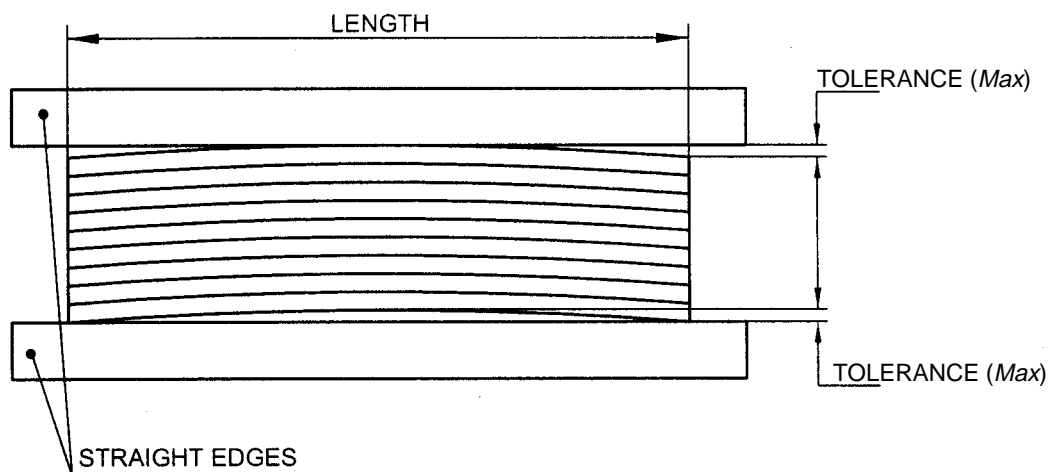


FIG. 1 TEST FOR WINDING OR BOWING IN THE LENGTH DIMENSION

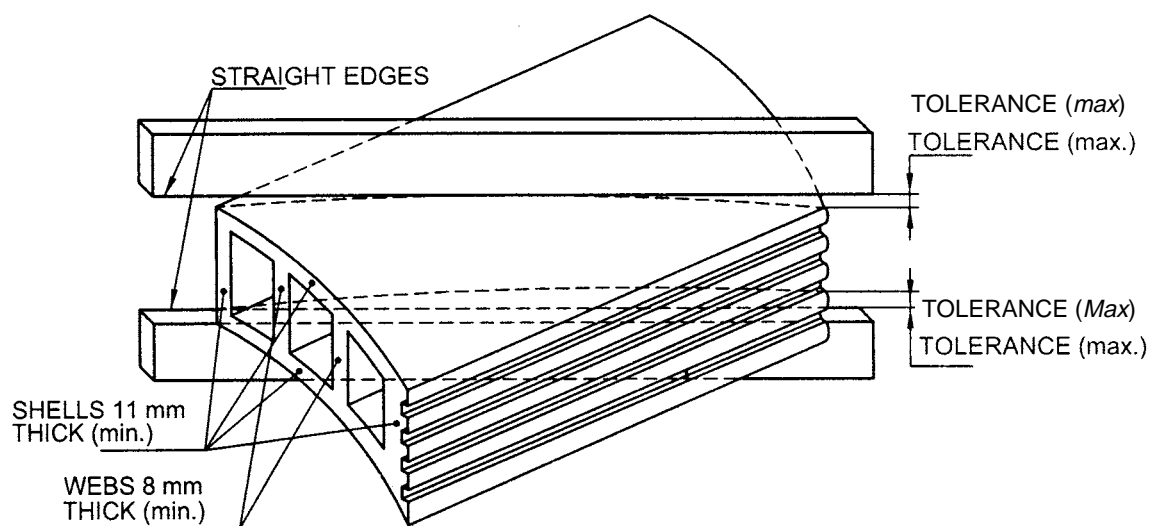


FIG. 2 TEST FOR CONCAVITY OR CONVEXITY

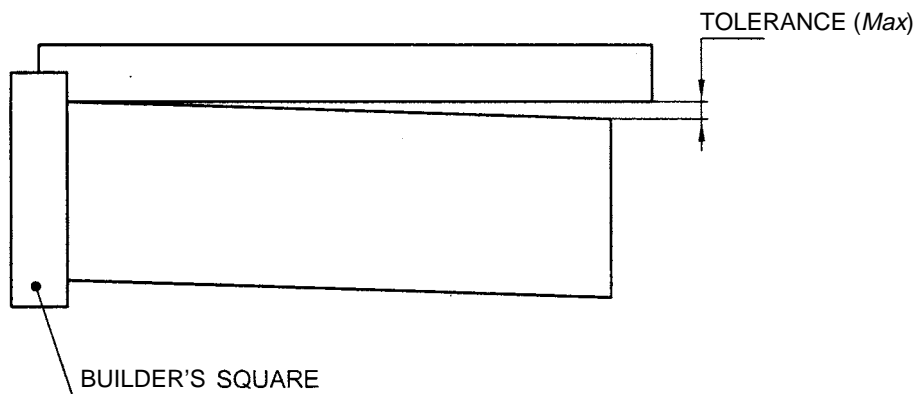


FIG. 3 TEST FOR CORRECTNESS OF EDGES

### 6.1.2 Hollow Blocks

The size of burnt clay hollow blocks when measured according to 6.2 shall be as follows:

<i>Length</i>	<i>Width</i>	<i>Height</i>
mm	mm	mm
400	200	200
400	150	200
400	100	200

**6.2** The length of central line of the four longest faces shall be measured nearest to the next millimeter and the length of the bricks/blocks expressed, in millimetres, as the average of these four measurements. The width and height of the bricks/blocks shall be similarly measured.

### 6.3 Tolerances

#### 6.3.1 Hollow Bricks

**6.3.1.1** The dimensions of bricks shall be tested in accordance with the procedure given in 6.3.1.1.1 and shall be within following limits per twenty blocks:

<i>Dimensions of Brick</i>	<i>Overall Measurements of 20 Bricks</i>	
	<i>Min</i>	<i>Max</i>
mm	mm	mm
290	5 680	5 920
190	3 720	3 880
140	2 740	2 860
90	1 760	1 840

**6.3.1.1.1** Twenty (or more according to the size of stack) whole bricks shall be selected at random from the sample selected under 9. All blisters, loose particles of clay and small projections shall be removed. They shall then be arranged upon a level surface successively in contact with each other and in a straight line. The overall length of the assembled bricks shall be measured with a steel tape or other suitable inextensible measure sufficiently long to measure the whole row at one stretch. Measurement by repeated application of short rule or measure shall not be permitted. If, for any reason, it is found impracticable to measure bricks in one row, the sample may be divided into rows of 10 bricks each which shall be measured separately to the nearest millimetre. All these dimensions shall be added together.

**6.3.1.2** In addition, the size of any individual brick in the sample shall not exceed the corresponding modular size as given in the following table:

<i>Dimensions of Brick</i>	<i>Modular Size</i>
mm	mm
290	300
190	200
140	150
90	100

#### 6.3.2 Hollow Blocks

The permissible tolerance on dimensions of individual blocks shall be as below:

<i>Dimensions of Block</i>	<i>Tolerance</i>
mm	mm
400	± 8
200	± 4
150	± 3
100	± 2

## 7 HOLLOWS

**7.1** The volume of holes passing through the brick/block shall be more than 25 percent of the total volume of the brick/block and the holes shall not be small (*see* IS 2248).

**7.2** The hollows may be at right angle or parallel to the bearing surface.

**7.3** The thickness of any shell shall not be less than 11 mm and that of any web not less than 8 mm.

## 8 PHYSICAL REQUIREMENTS

### 8.1 Crushing Strength

**8.1.1** The minimum average crushing strength of the bricks/blocks when determined in accordance with the procedure laid down in Annex A shall be 3.5 N/mm<sup>2</sup>.

**8.1.1.1** The crushing strength of any individual brick/block shall not fall below the minimum average crushing strength by more than 15 percent.

### 8.2 Water Absorption

The average water absorption of the bricks/blocks by mass when tested in accordance with the procedure laid down in Annex B shall not be more than 20 percent.

### 8.3 Efflorescence

The bricks/blocks when tested in accordance with the procedure laid down in IS 3495 (Part 3) shall have a rating not more than 'slight'.

## 9 SAMPLING AND CRITERIA FOR CONFORMITY

Sampling and criteria for conformity of the bricks/

blocks shall be done in accordance with the procedure laid down in IS 5454.

## **10 MANUFACTURER'S CERTIFICATE**

The manufacturer shall satisfy himself that the bricks/blocks conform to the requirements of this standard and, if requested, shall supply a certificate to this effect to the purchaser or his representative.

## **11 MARKING**

**11.1** Each brick/block shall be clearly and permanently marked with the following information:

- a) Identification of the manufacturer; and
- b) Year of manufacture, if required.

## **11.2 BIS Certification Marking**

Each brick/block may also be marked with the Standard Mark.

**11.2.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

# **ANNEX A**

(Clause 8.1.1)

## **METHOD OF TEST FOR DETERMINATION OF CRUSHING STRENGTH**

### **A-1 TEST SPECIMENS**

All the specimens selected in accordance with 9 shall be tested for determination of average crushing strength of the lot.

### **A-2 PREPARATION OF SPECIMEN**

Each brick/block shall be immersed in water, maintained at  $27 \pm 2^\circ\text{C}$  for a period of 24 h and then bedded with cement-sand mortar as follows:

A steel plate not less than 10 mm thick, machined on one side to give a smooth plane surface, shall be firmly supported with the machined surface uppermost and levelled in two directions at right angles by means of a spirit-level. The machined face shall be coated with a film of mould oil to prevent mortar adhering. A layer of cement-sand mortar, composed of one part of cement to one part of clean sand (of grade 2.36 mm or less) by volume, shall then be placed on the plate and one bearing face of the brick/block pressed firmly into the layer to form a bed as uniform as possible in thickness. The perforations (in case these are perpendicular to the bearing surface) shall be closed with paper so that the mortar does not penetrate deeply in these holes. The mortar bed shall at no point be less than 6 mm in thickness. The mortar bed over each cavity shall be pierced by a small hole formed while the mortar is still plastic. This will allow the removal of water from the cavities before testing.

The surplus mortar shall be trimmed off flush with the sides of the brick/block. The brick/block and mortar shall then be covered with a damp cloth and shall

remain undisturbed for a minimum period of 24 h after which the bedded brick/block shall be carefully removed from the steel plate without damaging the mortar and inverted. The second bearing face shall be bedded in the same manner as the first, using the same cement-sand mix and water-cement ratio as before. The two mortar faces shall be made parallel to each other by levelling the specimen in two directions at right angles on the second mortar layer by means of a spirit-level on the face of the new uppermost first mortar facing. After bedding, the brick/block shall again be covered with a damp cloth for another 24 h and then immersed in water until tested. The period of immersion shall be such that 75 mm mortar cubes, made from the same batch used for bedding the second bed face and stored under identical conditions shall have a crushing strength of not less than  $28 \text{ N/mm}^2$  ( $H \approx 280 \text{ kgf/cm}^2$ ) and not more than  $42 \text{ N/mm}^2$  ( $H \approx 420 \text{ kgf/cm}^2$ ).

### **A-3 MEASUREMENT OF CRUSHING STRENGTH**

When the mortar strength has attained the required value of not less than  $28 \text{ N/mm}^2$  and not more than  $42 \text{ N/mm}^2$ , the specimen shall be crushed between 3-ply plywood sheets approximately 3 mm thick. The load shall be applied axially at a uniform rate, of  $14 \text{ N/mm}^2$  ( $H \approx 140 \text{ kgf/cm}^2$ ) per minute till the failure occurs.

### **A-4 CALCULATION OF RESULTS**

**A-4.1** The maximum load in N supported by the specimen before failure occurs, divided by the area

(see A-4.1.1) of the unit in square millimetres, shall be taken as the crushing strength of the brick/block. From the test results of crushing strength obtained for all the specimens tested, the average value shall be calculated and reported as the average crushing strength of the lot.

**A-4.1.1** The two surfaces of the brick/block that would

normally be placed horizontally in the wall shall be treated as the bearing faces. The overall dimension of each bed face shall be measured to the nearest millimetre and the area (gross area) of that face having the smaller area shall be taken as the area of the specimen for calculating the crushing strength.

## ANNEX B

(Clause 8.2)

### WATER ABSORPTION TEST

#### B-1 TEST SPECIMEN

All the specimens selected in accordance with 9 shall be tested for determination of average water absorption of the lot.

#### B-2 APPARATUS

The apparatus shall consist of a balance, sensitive to within 0.1 percent of the mass of the specimen; and a ventilated oven.

#### B-3 PROCEDURE

**B-3.1** The test specimen shall be dried to constant mass in the ventilated oven at 110 to 115°C. If the specimen is known to be relatively dry, this may normally be accomplished in 48 h but if the specimen is wet, several additional hours may be required to attain constant mass. The specimen shall then be cooled approximately to room temperature and weighed. In a ventilated room bricks/ blocks, properly separated, require four hours for cooling, unless an electric fan passes air over them continuously, in which case 2 h may suffice. Specimens

noticeably warm to touch shall not be used for the absorption test. The dry specimens shall be completely immersed without preliminary partial immersion in clean water at  $27 \pm 2^\circ\text{C}$  for 24 h. Each specimen shall then be removed, the surface water wiped off with a damp cloth and weighed. Weighing of any one specimen shall be completed within 3 min after removing the specimen from water.

**B-3.2** The percentage water absorption by mass shall be calculated as given below:

$$\text{Water absorption, percent by mass} = \frac{M_2 - M_1}{M_1} \times 100$$

where

$M_2$  = mass after soaking in water; and  
 $M_1$  = mass of the dry specimen.

**B-3.3** From the test results of water absorption obtained for all the specimens tested, the average value shall be calculated and reported as the average water absorption of the lot.

**ANNEX C***(Foreword)***COMMITTEE COMPOSITION**

## Clay and Stabilized Soil Products for Construction Sectional Committee, CED 30

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity (651/37, Ganga Enclave, Sainik Colony, Roorkee 247667)	DR J. M. BHATNAGAR ( <b>Chairman</b> )
A. Albuquerque and Sons, Mangalore	SHRI GEORGE ALBUQUERQUE PAI SHRI J. L. PAVAMANI ( <i>Alternate</i> )
A. P. Engineering Research Laboratories, Hyderabad	SHRI G. CHITTI BABBU SHRI P. JOHN VICTOR ( <i>Alternate</i> )
All India Brick and Tile Manufacturers' Federation, New Delhi	SHRI R. P. S. CHANDEL SHRI R. K. VERMA ( <i>Alternate</i> )
All Kerala Tile Manufacturers Association, Kozhikode	REPRESENTATIVE
Building Materials & Technology Promotion Council, New Delhi	SHRI J. K. PRASAD SHRI C. N. JHA ( <i>Alternate</i> )
Central Building Research Institute (CSIR), Roorkee	SHRI A. K. MINOCHA SHRI L. P. SINGH ( <i>Alternate</i> )
Central Glass and Ceramic Research Institute (CGCRI), Khurja Centre, Khurja	DR C. S. PRASAD SHRI YAD RAM ( <i>Alternate</i> )
Central Public Works Department, New Delhi	SHRI A. K. SHARMA SHRI S. P. CHOUDHARY ( <i>Alternate</i> )
Central Soil and Materials Research Station, New Delhi	SHRI N. SIVAKUMAR SHRI P. K. JHA ( <i>Alternate</i> )
Delhi Development Authority, New Delhi	SHRI G. R. SHIROMANI SHRI LACHHMAN SINGH ( <i>Alternate</i> )
Department of Atomic Energy, Mumbai	SHRI D. R. BATLIWALA SHRI M. G. WAGH ( <i>Alternate</i> )
Development Alternatives, New Delhi	SHRI ARUN KUMAR SHRI SOUMEN MAITY ( <i>Alternate</i> )
Fly Ash Mission Unit (Ministry of Science and Technology), New Delhi	DR VIMAL KUMAR
Gujarat Engineering Research Institute, Vadodara	SHRI B. M. RAO SHRI KAMALANAYAN L. DAVE ( <i>Alternate</i> )
Housing and Urban Development Corporation Ltd, New Delhi	SHRI SAMIR MITRA SHRI RAJESH SHARMA ( <i>Alternate</i> )
Indian Buildings Congress, New Delhi	REPRESENTATIVE
Indian Institute of Science, Bangalore	PROF B. V. VENKATARAMA REDDY DR K. S. NANJUNDA RAO ( <i>Alternate</i> )
Military Engineer Services, Engineer-in-Chief's Branch, New Delhi	SHRIMATI MALA MOHAN SHRI J. THAKUR ( <i>Alternate</i> )
National Buildings Construction Corporation, New Delhi	SHRI RAJENDRA CHAUDHARI SHRI H. K. DHAWAN ( <i>Alternate</i> )
National Test House, Kolkata	SHRI D. V. S. PRASAD SHRI NARESH GUPTA ( <i>Alternate</i> )
National Thermal Power Corporation Limited, Noida	SHRI JITENDRA KUMAR
North-East Institute of Science and Technology (Formerly RRL), Jorhat	SHRI PINAKI SENGUPTA SHRI PRANAB BARAKAKATI ( <i>Alternate</i> )
Public Works Department, Chennai	SUPERINTENDING ENGINEER EXECUTIVE ENGINEER ( <i>Alternate</i> )
Research, Designs and Standards Organization, Ministry of Railways, Lucknow	SHRI PRABHAT KUMAR SHRI ASHUTOSH KUMAR ( <i>Alternate</i> )



<i>Organization</i>	<i>Representative(s)</i>
The Bricks and Tiles Manufacturers' Association, Chennai	SHRI G. GAJENDIRAN SHRI P. DEENADAYALU ( <i>Alternate</i> )
The Commonwealth Trust (India), Calicut	SHRI M. G. GOPINATH SHRI N. PRAMOD ( <i>Alternate</i> )
The Energy And Resources Institute, New Delhi	SHRI SACHIN KUMAR SHRIMATI SUDIPTA SINGH ( <i>Alternate</i> )
U. P. Brick Kiln Association (Regd), Lucknow	REPRESENTATIVE
Wienerberger India Pvt Ltd, Bangalore	SHRI KUNDAN B. DIGHE SHRI D. J. JAGADEESHA ( <i>Alternate</i> )
BIS Directorate General	SHRI D. K. AGRAWAL, Scientist 'F' and Head (Civil Engg) [Representing Director General ( <i>Ex-officio</i> )]

*Member Secretary*  
SHRIMATI MADHURIMA MADHAV  
Scientist 'B' (Civil Engg), BIS



## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

## Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

## Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: CED 30 (7817).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

### BUREAU OF INDIAN STANDARDS

#### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.org.in](http://www.bis.org.in)

#### Regional Offices:

#### Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg  
NEW DELHI 110002

{ 2323 7617  
2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi  
KOLKATA 700054

{ 2337 8499, 2337 8561  
2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 260 3843  
260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113

{ 2254 1216, 2254 1442  
2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)  
MUMBAI 400093

{ 2832 9295, 2832 7858  
2832 7891, 2832 7892

**Branches:** AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN.  
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. KOCHI.  
LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. VISAKHAPATNAM.